REMARKS

Applicants respectfully request reconsideration of the present application in view of the foregoing amendments and in view of the reasons that follow. After amending the claims as set forth above, claims 1, 3-5, 10-18, 20-22, and 24-25 are now pending in this application.

Applicants wish to thank the Examiner for the careful consideration given to the claims.

Claim amendments

Claim 1 has been amended to recite (1) "a metal burner membrane configured such that, during use, gas penetrates before being ignited and resulting in visible flames," (2) "wherein said membrane comprises a fabric comprising stainless steel fibers" and (3) "wherein said transition region has a smallest radius of curvature $r_{transition}$ being larger than or equal to 0.02 x R_{base} and being smaller than or equal to 0.7 x R_{base}." Support for feature (1) can be found, for example, page 1, lines 31-32; page 3, lines 14-18; and page 5, lines 5-13 of the specification where it is clear from these passages (notably page 1, line 32 referring to "improved flame distribution;" page 3, line 15 referring to a "flame front;" and page 5, lines 6, 10 and 11 referring to "isolating the flame from the plate," "improved flame distribution," and "a flame front," respectively) that indeed the gas burner described is not an internal gas burner, but an external burner showing flames. Support for feature (2) is simply the incorporation of the subject matter of now canceled claim 2. Support for feature (3) can be found on page 2, lines 7-8 and exemplified on page 9, lines 7-16 of the specification.

Claims 2, 19, and 23 have been canceled.

Claims 3 and 5 have been amended to depend from claim 1.

Claim 10 has been amended to recite "wherein said base section has a shape of a conical surface of a frustum of a cone." Support for this amendment can be found in Figs. 2, 3a, and 3b, wherein the base section 201 of Figs. 2, 3a and 3b is depicted.

Claim 22 has been amended to recite "wherein the smallest radius of curvature R_{base} of the base section and the smallest radius of curvature $r_{transition}$ of the transition region follow the following relation: $0.02 \times R_{base} \leq r_{transition} \leq 0.35 \times R_{base}$." Support for this claim can be found on page 2, lines 8-9 of the specification.

Claim 24 has been added and recites "wherein the smallest radius of curvature R_{base} of the base section and the smallest radius of curvature $r_{transition}$ of the transition region follow the following relation: $0.09 \times R_{base} \leq r_{transition} \leq 0.7 \times R_{base}$." Support for the upper limit can be found on page 2, lines 7-8 of the specification and support for the lower limit can be found on page 9, lines 7-16 (in the case where R_{base} is 45 mm and $r_{transition}$ is 4 mm).

Claim 25 has been added and recites "wherein the smallest radius of curvature R_{base} of the base section and the smallest radius of curvature $r_{transition}$ of the transition region follow the following relation: $0.18 \times R_{base} \leq r_{transition} \leq 0.35 \times R_{base}$." Support for the upper limit can be found on page 2, lines 8-9 of the specification and support for the lower limit can be found on page 9, lines 7-16 (in the case where R_{base} is 45 mm and $r_{transition}$ is 8 mm).

Withdrawal of the rejections based on Weber

Applicant notes the PTO's comments regarding the Applicants' arguments related to the rejections based on U.S. Patent 5,468,143 ("Weber") on page 2 of the Office Action. Without commenting on the appropriateness of the PTO's position, Applicant considers the PTO's arguments moot because the rejections based on Weber have been withdrawn. Because the rejections based on Weber have been withdrawn, no further comment from Applicants is necessary.

Rejection of claim 10 based on 35 U.S.C. 112, second paragraph

Claim 10 is rejected under 35 U.S.C. 112, second paragraph, as allegedly being indefinite because "it is not possible for the base to be frustoconical." (Page 3 of the Office Action.) Claim 10 has been amended to recite " wherein said base section has a shape of a conical surface of a frustum of a cone." This shape is depicted as the base section 201 of Figs. 2, 3a and 3b. The "frustum of a cone" is the same as a "frustocone," i.e. the solid body that remains after cutting off the top of a cone by a plane parallel or inclined to the base of the cone. The "conical surface" is that part of the surface of a frustum of a cone that corresponds with what remains of the surface of the cone. As the base section is a curved two dimensional surface, it is only the shape of the conical surface that was intended to be depicted by 201. In the embodiment of Fig. 2, the base section 201 reaches its minimum radius of curvature on the circle 204. (Page 6, lines 26-29 of the specification.) Because claim 10 has been

amended, claim 10 is considered definite. For at least these reasons, favorable reconsideration of the rejection is respectfully requested.

Rejection of claims 22-23 are based on 35 U.S.C. 112, first paragraph

Claims 22-23 are rejected under 35 U.S.C. 112, first paragraph, as allegedly failing to comply with the written description requirement. Claim 22 has been amended to recite "wherein the smallest radius of curvature R_{base} of the base section and the smallest radius of curvature $r_{transition}$ of the transition region follow the following relation: $0.02 \times R_{base} \leq r_{transition} \leq 0.35 \times R_{base}$." Support for this claim can be found on page 2, lines 8-9 of the specification. Claim 23 has been canceled, which renders the rejection of this claim moot. For at least these reasons, favorable reconsideration of the rejection is respectfully requested.

Rejection of claims 1, 19, and 22-23 based on Marrecau

Claims 1 and 19 are rejected under 35 U.S.C. 102(b) as allegedly being anticipated by U.S. Patent 6,149,424 ("Marrecau"). Claims 22-23 are rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Marrecau. For at least the following reasons, these rejections are traversed.

Claim 1 (as amended) recites, among other things, a metal burner membrane configured such that, during use, gas penetrates before being ignited and resulting in visible flames. The membrane comprises a fabric comprising stainless steel fibers. The membrane of the gas burner comprises a base section having a smallest radius of curvature being R_{base}, a closing section, and a transition region connecting said base section to said closing section, wherein said membrane is uninterrupted. The transition region has a smallest radius of curvature $r_{transition}$ being larger than or equal to $0.02 \times R_{base}$ and being smaller than or equal to $0.7 \times R_{base}$. Marrecau does not teach or suggest this combination of features.

For instance, Marrecau does not teach or suggest a transition region having a smallest radius of curvature $r_{transition}$ being larger than or equal to $0.02 \times R_{base}$ and being smaller than or equal to $0.7 \times R_{base}$. This claimed range cannot be derived from Marrecau because Fig. 1 (upon which the PTO relies for disclosing the range of $r_{transition}$) is not drawn to scale and only schematically explains the features of the gas burner of Marrecau. (Column 2, lines 56-63 of Marrecau.) Thus, the dimensions shown in Fig. 1 of Marrecau are of little value for providing

the claimed range of $r_{transition}$. (See MPEP 2125.[1]) Therefore, claim 1 is allowable over Marrecau.

The PTO asserts (in relation to the rejection of claims 22 and now canceled claim 23) that:

> [i]t would have been obvious...to optimize the range of R-base and r-transition for the purpose of obtaining desired flame shape and temperature characteristics. Marrecau discloses a burner membrane with uneven flame shape characteristic. It would have been obvious...to design and optimize the shape of the burner membrane. This optimization of ranges would not have entailed undue experimentation and would have been within the capabilities of someone of ordinary skill in the art. (Page 13 of the Office Action.)

The argument of discovering optimum or workable ranges is inappropriate. "A particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation." (MPEP 2144.05 quoting (*In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977).) In this case, there is no prior art aside from the present application's own disclosure that $r_{transition}$ is a results-effective variable that would lead to one of ordinary skill in the art to want to optimize it. Indeed, nowhere is it disclosed in Marrecau that there is a concern about the geometrical radii of curvature being important for the increase of the dynamic range of the gas burner (as described in the present application). Because $r_{transition}$ has not been shown to be a results-effective variable, and no reason or evidence has been set forth establishing why one of ordinary skill in the art would want to alter the range of $r_{transition}$ so as to "optimize" it, the rejection based on Marrecau is improper.

Also, Marrecau is concerned with internal radiation reflection and not with gas flow distributions as indicated by the arrows 26 in Fig. 1 of Marrecau showing the direction in which heat is radiated from one direction to the other (not gas flow). (Column 3, lines 10-16 of Marrecau.) Because the shape is based on heat radiation, the teaching of Marrecau would not be subjected to an optimization based on gas flow that would lead one of ordinary skill in the art to the claimed range of $r_{transition}$ as recited in claim 1. Moreover the shape of the

[1] "When the reference does not disclose that the drawings are to scale and is silent as to dimensions, arguments based on measurement of the drawing features are of little value. See *Hockerson-Halberstadt, Inc. v. Avia Group Int'l*, 222 F.3d 951, 956, 55 USPQ2d 1487, 1491"

membrane of Marrecau would lead to an addition of gas flows directed to one another and hence to an increased gas velocity in the transition region contrary to the teaching of the present application wherein due to the difference in curvature, the flow of the gas is reduced in the transition region. Thus, one of ordinary skill in the art would not be lead to the invention of claim 1 based on the teachings of Marrecau. Thus, claim 1 is allowable over Marrecau.

Furthermore, Marrecau is not concerned with increasing the dynamic range of the gas burner membrane which is the prime concern of the invention of claim 1. (See page 1, lines 27-28; page 3, lines 11-27; page 8, lines 19-22 of the specification.) Marrecau does not discuss the impact the radii of curvature has on the flame front (see Fig. 3b and page 8, lines 9-17 of the specification.) Indeed, the surface as explained in Marrecau would oppose the teaching of the application as the flow out of the membrane in the recess 26 of Fig. 1 of Marrecau would lead to an increased gas flow because both gas streams would combine together. Thus, one of ordinary skill in the art would not arrive at the invention of claim 1 using the teachings of Marrecau.

Claim 22 depends from and contains all the features of claim 1, and is allowable for the same reasons as claim 1, without regard to the further patentable features contained therein.

Claims 19 and 23 have been canceled, which renders the rejection of these claims moot.

For at least these reasons, favorable reconsideration of the rejections is respectfully requested.

Rejection of claims 2-5, 10-11, and 20-21 based on Marrecau and Dewaegheneire

Claims 2-5, 10-11, and 20-21 are rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Marrecau and U.S. Patent 6,065,963 ("Dewaegheneire"). This rejection is traversed for at least the following reasons.

Claim 2 has been canceled, which renders the rejection of this claim moot.

Claims 3-5, 10-11, and 20-21 depend from and contain all the features of claim 1. As previously mentioned, Marrecau fails to disclose a gas burner in which the smallest radius of curvature of the transition region $r_{transition}$ is in the range of $0.02 \times R_{base}$ to $0.7 \times R_{base}$, wherein

R_{base} is the smallest radius of curvature for the base section. Dewaegheneire does not cure all these deficiencies because Dewaegheneire does not teach or suggest the claimed range for $r_{transition}$. Thus, claim 1 and its dependent claims 3-5, 10-11, and 20-21 are allowable over Marrecau and Dewaegheneire.

Also, neither Marrecau nor Dewaegheneire is concerned with increasing the dynamic range of the gas burner membrane which is the prime concern of the invention of claim 1. (See page 1, lines 27-28; page 3, lines 11-27; page 8, lines 19-22 of the specification.) Neither Marrecau nor Dewaegheneire discusses the impact the radii of curvature has on the flame front (see Fig. 3b and page 8, lines 9-17 of the specification.) Indeed, the surface as explained in Marrecau would oppose the teaching of the application as the flow out of the membrane in the recess 26 of Fig. 1 of Marrecau would lead to an increased gas flow because both gas streams would combine together. Thus, one of ordinary skill in the art would not be able to combine Marrecau and Dewaegheneire to arrive at the invention of claim 1. Thus, claim 1 and its dependent claims 3-5, 10-11, and 20-21 are allowable over Marrecau and Dewaegheneire.

Furthermore, it is clear that the combination of Marrecau and Dewaegheneire does not teach or suggest all of the features of claim 10 or 11.

Claim 10 recites "wherein said base section has a shape of a conical surface of a frustum of a cone." Marrecau teaches the importance of having surfaces mutually facing one another in order to increase the thermal output of the burner membrane. (Column 2, lines 19-24 of Marrecau.) It is described that the surface area of the burner membrane within its holding rim must be at least 5% higher than a flat surface within the holding rim, in order to obtain a sizeable increase in radiation efficiency. (Column 1, lines 30-36 of Marrecau.) Nowhere is it disclosed in Marrecau that there is a concern about the geometrical radii of curvature being important for the increase of the dynamic range of the gas burner (as described in the present application) or that the base section has the claimed shape of a conical surface of a frustum of a cone.

Dewaegheneire is directed to solving the flaring problem occurring with large cylindrical surface gas burners, by giving them a cone shape, possibly truncated. The cone shape is beneficial in preventing the build-up of pressure at the top of the cone. (Column 1, lines 51-57 of Dewaegheneire.) Nowhere is it disclosed in Dewaegheneire that there must be

a curved transition region between the cap and the cone surface when considering the cone surface to be the base section. Moreover, nowhere is it said in Dewaegheneire that the burner membrane must be uninterrupted and continue from the cone surface to the cap without a seam and that the transition region has a smallest radius of curvature $r_{transition}$ being larger than or equal to 0.02 x R_{base} and being smaller than or equal to 0.7 x R_{base}.

Claim 11 recites "wherein said base section has a cylindrical shape." The PTO states "see Fig. 1 where the base section clearly has a cylindrical shape." (Page 7 of the Office Action.) From the Office Action, it is unclear if "Fig. 1" is referring to Fig. 1 of Dewaegheneire or Fig. 1 of Marrecau. However, Fig. 1 of Dewaegheneire does not show a base section having a cylindrical shape For Marrecau, the mounting frame 13 of the gas-burner may be cylindrical in part but it is not part of the burner membrane and is not gas permeable. Therefore, the mounting frame 13 cannot be the base section of the membrane of claim 1. Because neither Marrecau nor Dewaegheneire teaches or suggests a base section having a cylindrical shape, claim 11 is allowable.

For at least these reasons, favorable reconsideration of the rejection is respectfully requested.

Rejection of claims 12 and 16-18 based on Marrecau, Dewaegheneire, and Sterick

Claims 12 and 16-18 are rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Marrecau, Dewaegheneire, and U.S. Patent 2,822,799 ("Sterick"). This rejection is traversed for at least the following reasons.

Claims 12 and 16-18 depend from and contain all the features of claim 1. As previously mentioned, Marrecau and Dewaegheneire fail to disclose a gas burner in which the smallest radius of curvature of the transition region $r_{transition}$ is in the range of $0.02 \times R_{base}$ to $0.7 \times R_{base}$, wherein R_{base} is the smallest radius of curvature for the base section. Sterick does not cure all these deficiencies. Thus, claim 1 and its dependent claims 12 and 16-18 are allowable over Marrecau, Dewaegheneire, and Sterick.

Furthermore, one of ordinary skill in the art would not combine Marrecau, Dewaegheneire, and Sterick in order to arrive at the claimed invention of claim 1 because the burners of Sterick are concerned with the reflecting of heat using metal fibers. (Column 1, lines 58 to column 2, lines 5 of Sterick.) Although there is a plurality of holes 8b and 15a for

venting the fumes from the burner, there is no reason to use the metal shield 8 or 15 of Sterick as a burner membrane through which gas penetrates. The use of the heating unit of Sterick with the burners of Marrecau and/or Dewaegheneire to arrive at the gas burner of claim 1 is not straightforward as they concern total different types of burners wherein the fibers are used as insulation materials in one instance and a material for a burner membrane in another instance.

Furthermore, the use of the shield 8 or 15 of Sterick in the membrane of either Marrecau or Dewaegheneire changes the function of the shield of Sterick, which makes the proposed modification non-obvious. MPEP 2143 suggests that a conclusion that a claim would have been obvious when all the claimed elements were known in the prior art, one of ordinary skill in the art could have combined the elements with no change in their respective functions, and the combination yielded nothing more than predictable results cannot be made if there is a change in the function of the element found in the prior art. Because the shield of Sterick has a change in function from a reflector of heat to a burner membrane where gas penetrate therethrough in the proposed combination, the proposed modification based on the teachings of Sterick is improper, and claim 1 and its dependent claims 12 and 16-18 are allowable.

For at least these reasons, favorable reconsideration of the rejection is respectfully requested.

Rejection of claims 13-15 based on Marrecau, Dewaegheneire, and Karlovetz

Claims 13-15 are rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Marrecau, Dewaegheneire, and U.S. Patent 3,857,670 ("Karlovetz"). Claims 13-15 depend from and contain all the features of claim 1. As previously mentioned, Marrecau and Dewaegheneire fail to disclose a gas burner in which the smallest radius of curvature of the transition region $r_{transition}$ is in the range of $0.02 \times R_{base}$ to $0.7 \times R_{base}$, wherein R_{base} is the smallest radius of curvature for the base section. Karlovetz does not cure all these deficiencies. The gas burner membrane of Karlovetz is consistently identified with number 18 in the patent. However, it is mentioned that "[t]he central portion of layers of mesh are welded to each other at the points indicated by the reference number 23 and, after welding, the central portions are coined convex" for pre-establishing the direction of expansion of the

screen. (Column 4, lines 32-34 of Karlovetz.) Fig. 6 of Karlovetz shows that the bulging is slight and the curvature does not meet the claimed range of $r_{transition}$ of claim 1. Moreover, the burner membrane is built up of different meshes and not from stainless steel fibers. Karlovetz, therefore, does not cure the deficiencies of Marrecau and Dewaegheneire, and claim 1 and its dependent claims 13-15 are allowable over Marrecau, Dewaegheneire, and Karlovetz. For at least these reasons, favorable reconsideration of the rejection is respectfully requested.

Conclusion

Applicants believe that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing or a credit card payment form being unsigned, providing incorrect information resulting in a rejected credit card transaction, or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicants hereby petition for such extension under 37 C.F.R. §1.136 and authorize payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

Date 6/22/2009

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